CLAIMS

I claim:

(CANCELLED) 1. A magnetically responsive object or capsule whose movement is controlled by an external magnetic field. The moving capsule may or may not have a physical connection to other items. The external magnetic field is created by any number of magnetic field generating structures with the arbitrary positioning of each structure. The number and configuration of the structures will depend on the design parameters. The capsule will be moved by appropriately changing the current distribution within each structure and consequently the magnetic field. As necessary, the actual field generating structures and/or system being examined will be manually/autonomously moved in conjunction with the changing current to allow the capsule to be moved throughout the system under examination. For the purpose of a medical examination, the capsule will be referred to as magnetically propelled capsule endoscopy.

(CANCELLED) 2. Referring to the instrument in claim 1, if the capsule does not physically connect to other items then the capsule may include the following:

magnets or magnetizable materials for movement and direction control; magnetic sensors; light sources; imaging lenses; transmitter and receiver for communication; magnetic pickup for power generation; gyroscope/accelerometer for location information; mechanical equipment for tissue biopsy/excision or other procedures; power source; electronics;

(CANCELLED) 3. Referring to the instrument in claim 1, if the capsule is physically connected to other items then the capsule may include the following:

magnets or magnetizable materials for movement and direction control; magnetic sensors; light sources, imaging lenses, power lines, communication lines, injection hoses, suction hoses and other lines/hoses extending out the back of the capsule and connecting to the external control device; gyroscope/accelerometer for location information; mechanical equipment for tissue biopsy/excision or other procedures; power source; electronics.

(CANCELLED) 4. Referring to the instrument in claim 1, magnetically propelled capsule endoscopy allows the gastrointestinal tract, reproductive tract, trachea/lungs, vascular system, or any body cavity to be viewed in real time from a wide range of angles.

(CANCELLED) 5. Referring to the instrument in claim 1, magnetically propelled capsule endoscopy allows for tissue biopsy/excision from a wide range of angles.

(CANCELLED) 6. Referring to the instrument in claim 1, magnetically propelled capsule endoscopy allows for a fast, comprehensive medical procedure with minimal anesthesia.

(CANCELLED) 7. Referring to the instrument in claim 1 (version as described in claim 2), the instrument allows power to be transferred to the capsule to recharge the power source through the use of the field generating structures. By holding the capsule stationary with some of the structures, the other structures may be used to rotate the external magnetic field to operate a small generator within the capsule to recharge the power source. The fundamental motion of the generator may be rotary, curvilinear or linear.

(CANCELLED) 8. Referring to the instrument in claim 1, the instrument allows for real time display of information, virtual three dimensional image of the completed portion of the exam, real time mapping of the capsule's trajectory, marking of points of interest and storage of data.

(CANCELLED) 9. Referring to the instrument in claim 1, the capsule allows the measurement of temperature, pH, substance concentration, pressure, strain, force, magnetic field, electric field and other physical quantities.

(CANCELLED) 10. Referring to the instrument in claim 1, the capsule allows the detection and production of sound waves, the detection and production of electromagnetic waves, the detection and production of elementary/nuclear particles and the examination by other modalities.

(NEW) 11.) A system for moving a capsule within a patient's body or within a non medical application which includes:

a capsule whose size and capabilities will depend on the design and application;

a capsule with or without an external physical connection will depend on the design and application;

a capsule that contains magnets or magnetizable materials for movement and direction control, wherein said capsule provides positional information via a gyroscope and an accelerometer to an external magnetic field generating system for the control of movement and direction, and wherein said capsule is controlled as necessary by the physical movement or field change of the field generating structures or the movement of the examined object.

(NEW) 12.) Referring to claim 11, the system allows for a medical examination of the digestive tract, reproductive tract, trachea, lungs, vascular system or any accessible body cavity.

(NEW) 13.) Referring to claim 11, the capsule with an external physical connection may have light sources, imaging lenses, power lines, communication lines, injection hoses, suction hoses and other lines and hoses extending from the capsule and connecting to an external control instrument.

(NEW) 14.) Referring to claim 11, the capsule without an external physical connection may have light sources, imaging lenses, cameras, communications and a power source.

(NEW) 15.) Referring to claim 11, the capsule with or without an external physical connection may have electronic control, magnetic sensors, the ability to operate under magnetic conditions, mechanical equipment for tissue biopsy and tissue excision or other procedures and the programming of a predetermined movement pattern.

(NEW) 16.) Referring to claim 11, by holding the capsule stationary with some of the field generating structures, the other field generating structures may be used to manipulate the external magnetic field to operate a small generator (whose motion may be rotary, curvilinear or linear) within the capsule to recharge the power source.

(NEW) 17.) Referring to claim 11, the instrument allows for real time display of information, virtual three dimensional image of the completed portion of the exam, real time mapping of the capsule's trajectory via the gyroscope and accelerometer, marking points of interest and storage of data from all sensors and equipment along the entire trajectory.

(NEW) 18.) Referring to claim 11, the capsule allows the measurement of temperature, pH, substance concentration, pressure, strain, force, magnetic field, electric field and other physical quantities.

(NEW) 19.) Referring to claim 11, the capsule allows the detection and production of sound waves, the detection and production of electromagnetic waves, the detection and production of elementary and nuclear particles and the examination by other modalities.

(NEW) 20.) Referring to claim 11, the externally generated magnetic field for controlling the capsules may be created by:

appropriately placing six field generating structures on the six faces of an imaginary cube;

have current running through each of the six field generating structures which effectively allows a pair of field generating structures to control each spatial dimension;

placing the patient undergoing the medical examination inside the imaginary cube;

moving the capsule by appropriately changing the field generating structure current and position and the patient's position.